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www.bnl.gov

April 20, 2009

Reference: I.F.B. No. CCWF-II
Central Chilled Water Facility – Phase II

Subject: Amendment No. 3 to I.F.B. No. CCWF-II

Dear Sirs/Madams:

Amendment No. 3 to the subject I.F.B. is issued to modify this solicitation as follows:

1. Addendum No. 3 to CCWF-II dated April 20, 2009 is attached hereto and made a part hereof. It describes changes to the specifications which are located at www.bnl.gov/pe/CCWF.

   Please note that revised drawings associated with the previous Amendment (Amendment 2) did not get attached to the scanned posting, but are also located at www.bnl.gov/pe/CCWF, under "Addendum 2 Revised Drawings".

2. The bid submission date is extended to May 01, 2009 at 3:00 P.M. Bids will be open IN PRIVATE.

3. Requests for Information will be accepted until April 24, 2009 only.

Please acknowledge Amendment No. 3 on the I.F.B. "Bid" page (page 3 of 6) on both copies that you will submit. Failure to acknowledge Amendment No. 3 may result in you bid being considered non-responsive.

Very truly yours,

Philip Gardner
Sr. Contracts Specialist

Attachments:
Addendum No. 3 dated 04/20/09

ln#g

BROOKHAVEN
NATIONAL LABORATORY

Facilities and Operations
Modernization Project Office
Building 134C
P.O. Box 5000
Upton, NY 11973-5000

Date: 04/20/09

ADDENDUM NO. 3

to

SPECIFICATIONS AND DRAWINGS

For

Central Chilled Water Facility – Phase II

BNL Job. No. 11705

GENERAL: This Addendum is to amend Drawings and Specifications dated February 19, 2009 issued with the Bid Documents.

Material, work, and workmanship, except where specified otherwise in this Addendum, shall conform to all requirements of Contract Documents and become a part thereof.

Central Chilled Water Facility II
Addendum #3

Specification Changes:

1. Section 00800, Delete Paragraph B.7. (Owner will furnish the Sonoxide system for installation by others. Contractor to leave piping capped where shown on the drawings.)

2. Section 01010, Delete Paragraph 1.2.B.1. (Owner will furnish the Sonoxide system for installation by others.) Contractor to leave piping capped where shown on the drawings.
3. Section 13855, Add Paragraph 1.2.B, "Integrated Controls is an acceptable supplier for automated logic (ATC) work. Other contractors meeting the requirements of Section 13855.1.3.D are acceptable."

4. Add Specification Section 07220, "Roof Insulation" (attached).

5. Replace Specification Section 07412, "Preformed Metal Siding" (attached). Note: this section replaces that issued with Addendum 2.
6. Section 15652, Replace Paragraph 1.C.2 with:
    - Chillers shall meet the specified minimum tonnage (1250 tons) at 85 F condensing water temperature with 42 f leaving evaporator water temperature. Flow rates shall be as specified on drawing M-611.There shall be zero tolerance at meeting capacity (1250 tons) at 85 F. Efficiency specified on drawing M-611schedule shall be meet with ARI tolerances at 85 f condenser water temperature. Efficiency at part loads shall be determined by calculations and test procedure outlined in ARI 550/590 within tolerances allowed by the ARI 550/590 standard.
    - One machine will be tested at 65 F, 85 F and 90.9 F condensing temperatures at minimum, 25%, 50%, 75% and 100% load in accordance with ARI 550/590 standard. Data shall be recorded per ARI 500/590 and part load efficiencies calculated.
    - The second machine will be tested only at full capacity (1250 tons zero tolerance) at 85F condenser water temperature.
    - The chiller shall be capable of operating continuously with condenser water temperatures as low as 65 F and as high as 90.9 F at all range of load conditions. Tripping on safeties, continuous surging, or other failure of the machine at these test conditions shall be considered failure of the factory test.

- At 90.9 F condenser water temperature, full load tonnage shall not be below 1170 tons and efficiency shall be better than 0.650 kw/ton.
- Chiller must meet ASHRAE 90.1 efficiency standards at 85 F condenser water temperatures.
- BNL will select which machine will be the first one tested at the full range of conditions.
- BNL personnel shall witness tests at vendor's facility.
- Failure of chillers to meet capacity or efficiency requirements' is grounds to refuse shipment.
- ARI 550/590 2003 standard shall be used for test procedure.

7. Section 15652, Add Paragraph 1.D.2, "Manufacture must provide a record of a sound test to confirm the design noise level of the specific model and configuration of machine at full load with 85 F condensing water temperatures. Previous test results of the exact machine configuration would be acceptable. If a full load sound test has never been performed on the chiller configuration, a sound test must be performed on one unit. Owner may witness at his option."

8. Section 15652, Paragraph 2.1.C.1, Clarify that chiller motors are 4160V.

9. Section 15770, Add Paragraph 1.1.A.3, "Cooling towers shall be FM approved."

Drawing Changes:

1. Twelve revised drawings were inadvertently omitted from the scanned posting of Addendum No.2 on FedBizOpps.gov. However, these drawings are posted on the CCWF II web site (http://www.bnl.gov/pe/CCWF/) along with all other specifications and drawings. Click on the button: "Addendum 2 Revised Drawings".

2. Drawing MP-100, Add 24"x6" Tee with valve and blind flange on 24" CHS header for future side stream filter (to match flow diagram MP-603).

3. Drawing MP-100, Add one 24"x14" Tee with valve and 14" blind flange on 30" CWR header for future connection (to match flow diagram MP-604).

4. Drawing MP-100, Add two 24"x14" Tees with valves and 14" blind flanges on 24" CWS header for future connections (to match flow diagram MP-604).

CCWF II
Addendum 3
New/Revised Specification Sections

SECTION 07220

ROOF INSULATION

PART 1 GENERAL

1.1 SUMMARY

A. Scope
   1. Provide complete roof insulation system including roof insulation, fastening system, tapered edge strips, tapered roof insulation, and other items necessary for a complete installation. Provide a system of the following type:
      a. A two-layer roof insulation system consisting of a mechanically-fastened first layer of polyisocyanurate insulation and a second layer of polyisocyanurate insulation set in hot bitumen.

B. Related Work Specified Under Other Sections
   1. Rough Carpentry - DIVISION 6
   2. Building insulation, other than roof insulation - SECTION 07210
   3. PVC Single Ply Roofing - SECTION 07533
   4. Roof Accessories - SECTION 07720
   5. Roof Drains - DIVISION 15

C. Related Work Performed Under Other Contracts
   1. Metal Roof Deck - Structural Steel and Metal Deck Contract

D. Products Furnished But Not Installed Under This Section
   1. Metal roof deck flute filler strips for temporary water cut-off by Roofer

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM):
   1. ASTM C1289 - Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.
   2. ASTM D570 - Test Method for Water Absorption of Plastics.

B. Factory Mutual Global (FMG):
   1. FMG - Approval Guide, Building Materials.
   2. FMG - Loss Prevention Data 1-28, Wind Loads to Roof Systems and Roof Deck Securement.
   3. FMG - Loss Prevention Data 1-29, Above Deck Roof Components (January 2009).
   4. FMG - Standard 4450, Class 1 Insulated Steel Deck Roofs.
   5. FMG - Standard 4470, Class 1 Roof Covers.

C. Underwriters Laboratory (UL):
   1. Class A rated roofing system

1.3 QUALITY ASSURANCE

A. Applicator Qualifications
   1. The applicator of the roof insulation shall be the applicator of the built-up roofing work and have a minimum of 5 years experience.

B. Design Criteria
   1. Provide the roof insulation system to conform with the following design criteria:
      a. U.L. Class A, Construction No. 1.
      b. F.M. Class I, per I-A90 requirements. Provide additional fasteners at permiters and corners to meet specified wind loads.
   2. All polyisocyanurate insulation thermal resistance "R" values shall be aged "R" values obtained per ASTM C518 test method in accordance with the 6 month conditioning procedure outlined in TIMA Technical Bulletin 281-1 and PIMA Technical Bulletin Number 101.
   3. The specified total overall insulation thermal resistance "R" value of the insulation system shall be the sum of the "R" values of all the insulation layers. The first layer of the insulation system shall be of thickness recommended by the insulation manufacturer to span the flutes of the metal roof deck used unless greater thicknesses are specified herein for the first layer or are required to meet the specified "R" value.
   4. The roof insulation must be approved by the roofing material manufacturer for use with their specific roofing system and the roofing guarantee required to be provided by them.

1.4 SUBMITTALS

A. Furnish submittals for items that are identified in this SECTION by a different typeface and a bracketed code (e.g., *Item [L]*). Refer to SECTION 01340 for definition of codes for types of submittals and the administrative requirements governing submittal procedure. General submittal requirements pertaining to this SECTION are specified herein under this Article.

B. *Roof Layout [D]:* Submit shop drawings for approval, showing the complete roof layout including:
   1. Insulation board stagger patterns and directions relative to roof deck directions.
   2. Roof insulation fastener patterns.
   3. Roof drains.
   4. Roof openings, crickets, valleys and saddles.
   5. Typical cross section details indicating arrangement, type and thickness of insulation at parapet, roof sump pan, fabricated and prefabricated curbs; insulation saddle/cricket details.

C. Submit manufacturers product data for the systems, materials, and methods of installation proposed for use. Such literature shall identify systems, each component, and shall certify compliance of each component with the current applicable ASTM, FM and U.L. Standards.

1.5 RECORD DOCUMENTS

A. Upon completion of the work, submit per SECTION 01720:
   1. A written certificate stating that the insulation system was provided per the CONTRACT DOCUMENTS.
   2. From the manufacturer, written certificate with regard to physical properties of bitumen delivered to the site by bulk tanker, per Article "DELIVERY" herein.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Delivery
   1. Deliver only specified and approved materials to the site. Deliver materials in original containers and packages with all seals and labels, including U.L., F.M., ASTM, and manufacturers labels intact for identification.

B. Storage And Handling
   1. Store materials at the site within temporary sheds or trailers. Such facilities must be well sealed and kept at least 5 degF warmer than the exterior ambient temperature, to ensure that materials remain dry. Do not use wet, damp, frozen or damaged materials. Do not store more than one day's supply of materials on the roof at any time. While on the roof, stack materials on pallets, and completely cover with incombustible waterproof tarpaulin whenever work is interrupted, or when there is precipitation of any kind. Securely tie the covering to the pallets in such a way as to be completely weathertight. Plastic covers and shrink-wrap covers by the manufacturers are not acceptable for project site storage.
      a. Protect foam type composite board insulation from extended exposure to the sun.
   2. Distribute materials temporarily stored on the roof to stay within the designated live-load limits of the roof construction. Provide ample bases under equipment and materials to distribute the weight to conform to these live-load limits. Do not store materials on, or transport materials across, completed roof areas.
   3. Receive and transport acoustic metal roof deck flute insulation from storage area to installation staging area. Protect such material from weather same as specified for the roof insulation. Material which becomes wet or otherwise made unacceptable for use shall be replaced at no cost to the OWNER.

1.7 PROJECT SITE CONDITIONS

A. Environmental Requirements
   1. Do not install materials in rain, cold, moisture, frost, snow or other climatic conditions which would incorporate moisture into the roof materials and prevent proper application and adhesion of bitumen. When the ambient air temperature is less than 45 degF, work will be permitted only upon written approval from the OWNER'S REPRESENTATIVE and then only after receipt of written assurance that materials will be installed properly and in full compliance with the SPECIFICATIONS under such conditions.
      a. Submit proposed cold weather construction procedures and methods of protection, in writing, which will be initiated, provided and maintained when the ambient

temperature falls below 45 degF, to ensure proper application of the work, in accordance with the requirements of this SECTION and the material manufacturers.

2. Phased construction of the insulation system is not an acceptable construction method. Coordinate the work of this SECTION with that of the roof covering SECTION, so that the systems are installed in conjunction with each other on a daily basis.
3. Prior to start of the work, a project site meeting of all parties concerned, will be arranged, to review the SPECIFICATIONS for all work included under this SECTION and to determine a complete understanding of the requirements and responsibilities relative to roof deck responsibility, scope of the work, storage and handling of materials, materials to be used, installation of materials and sequence of work and other matters affecting the construction so as to permit compliance with the intent of the CONTRACT DOCUMENTS.

PART 2 PRODUCTS

2.1 ROOF INSULATION SYSTEM

A. Polyisocyanurate Insulation System
   1. Total R Value. Furnish a two layer roof insulation system with an overall insulation thermal resistance "R" value of 30 minimum, except where otherwise specified herein, consisting of the following:
      a. First Layer. Polyisocyanurate Roof Insulation Board, 3 inch thick, having a minimum aged "R" value of 15, mechanically fastened.
      b. Second Layer. Polyisocyanurate Roof Insulation Board of thickness having a minimum aged "R" value of 15, mechanically fastened.
   2. Insulation to have a minimum compressive strength of 25 psi.
   3. Furnish Polyisocyanurate Roof Insulation Board at parapet walls, curbs and other such vertical surfaces to provide the overall thickness shown.
   4. Furnish Perlite or Polyisocyanurate Roof Insulation Board in roof sump pans to provide thickness, slope, and recessed areas as shown.

2.2 ROOF INSULATION MATERIALS

A. Polyisocyanurate Foam Insulation which meets or exceeds FS HH-I-1972/2, both faces covered with glass fiber felt; comply with FMG Standard 4450 Approval.
   1. Overlayered insulation board applied as a second layer with joints offset from bottom layer.
   2. Minimum compressive strength: 25 psi.

B. Roof Curb Insulation: Polyisocyanurate foam; thickness to match wood nailer.

C. Tapered Insulation: Provide crickets, saddles, and tapered insulation of same material as second layer of insulation; taper to the following slopes:
   1. Crickets and Saddles: 1/4 inch per foot or twice the slope of the roof, whichever is greater.
   2. Insulation Installed to Counterslope Roof Structure: 1/2 inch to the foot, or twice slope of roof, whichever is greater.

D. Glass Mat Gypsum Roof Board: ASTM C-1177. Zero flame spread and zero smoke developed per ASTM E84. Minimum 500 pounds per square compressive strength.

E. *Insulation Fasteners [P]*: F.M. approved metal screw-and-plate type mechanical insulation board fasteners, corrosion-resistant to meet the requirements of F.M. Specification 4470. Provide length as required to meet FM test requirements for uplift.
   1. For fastening of roof insulation board to metal deck:
      a. Buildex "Roofgrip".
      b. Construction Fasteners Inc. "Dekfast".
      c. Fabco "Insulfixx S"
      d. GAF "Gaftite Screw and Plate".
      e. Hilti "12-11 Standard Deck Screw and Plate".

F. *Joint Tape [P]*: Woven glass fiber cloth, 6 inches wide:
   1. Johns Manville Corp.

G. Accessories:
   1. Bonding Adhesive: Manufacturer's standard solvent-based bonding adhesive for membrane, and solvent-based bonding adhesive for base flashings.

PART 3 EXECUTION

3.1 EXAMINATION AND PREPARATION

A. Carefully inspect all surfaces upon which work is to be applied. The installation of any material will be considered an acceptance of the surface covered. Failure of work because of substrate or surface defects, or non-compliance with SPECIFICATION requirements, will require removal of work which becomes defective, and replacing with work conforming to the SPECIFICATIONS at no cost to the OWNER.

B. Apply materials over smooth, dry surfaces that are free from dirt, debris and other coatings that prevent adhesion of materials to be applied. Have all temporary structures, tools, equipment, loose rubbish and debris removed from areas to be covered. Do not apply materials over wet, damp, frosty or frozen surfaces. Do not apply materials when the effects of low temperature or excessive moisture would prevent bonding of materials, or would incorporate moisture into the system component materials.

3.2 ROOF INSULATION INSTALLATION

A. Multiple Layer Installation:
   1. Place long edge of boards parallel to deck flutes, forming joint over solid bearing. Lay first layer insulation units with long edge joints continuous and end joints staggered.
   2. Lay second layer of insulation with both long side and end joints offset 6 inches (15 cm) from joints below. Install insulation fastener and plate through both layers of insulation. Fastener and plate must be approved for and installed at the required density to achieve the

specified FMG 1A-90 system and in accordance with requirements of FMG Loss Prevention Data Sheet 1-29 for specified wind uplift requirements.

B. Lay insulation boards to moderate contact without forcing joints. Cut insulation to fit neatly to perimeter blocking and around protrusions through roof.
   1. Gaps between insulation boards, nailers and penetrations of 1/4 inch (0.64 cm) or greater are not acceptable.

C. Place roof crickets and tapered thickness insulation to the required slope pattern in accordance with manufacturer's published instructions.

D. Apply no more insulation than can be waterproofed with roofing membrane in same day.

E. Mechanically attach a single layer of insulation to manufactured metal curbs.

END OF SECTION

Revision History	
Date	**Rev. No.**
04-17-09	0

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SECTION 07412

PREFORMED METAL SIDING

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes
   1. Insulated Metal Siding: Provide nominal 3-1/2 inch thick fluted-profile field-assembled thermal-insulated metal siding to the extent shown.
   2. Provide siding in maximum lengths practicable to eliminate or minimize the number of end laps. For walls 30 feet or less in height, provide metal siding in full 1-piece continuous lengths without end laps. For walls over 30 feet in height where end laps are approved, provide die-set ends on sheets for flush overlap.
   3. All siding for this project, including exterior sheets, liner panels, subgirts, flashings, copings, trim members, closures, fasteners and other required items, shall be provided by a single manufacturer.

B. Related Work Specified in Other Sections
   1. Structural steel building framing - Division 5.
   2. Miscellaneous metal fabrications - Division 5.
   3. Flashing and Sheet Metal – Division 7.
   4. Sealant and calking of joints at perimeter of preformed metal siding abutting other construction – Division 7.
   5. Decorative painting of preformed metal siding on the interior of the building - Division 9.
   6. Pre-engineered Building – Division 13.

C. Related Work Performed Under Other Contracts
   1. Structural steel building framing – Structural Steel Contract

1.2 PERFORMANCE REQUIREMENTS

A. Design Criteria
   1. Provide metal siding having maximum deflection of 1/120 of clear span, per AISI "Specifications for the Design of Light Gage Cold-Formed Steel Structural Members" based on resistance to inward wind pressure and outward suction pressure of not less 20 psf, unless greater wind load value is noted on Drawings.
   2. When tested in test chamber of size to accommodate panels equal in height to maximum clear span and approximately 12 feet wide, at each application of pressure for a series of 6 such applications for each test, based on exterior siding sheet, siding shall conform to the following:
      a. Air Infiltration, per ASTM E 283. Maximum 0.02 cfm per square foot of wall area at air pressure difference of 1.57 lbf/psf.

b. Water Penetration per ASTM E 331. No visual evidence of water penetration per AAMA 501-83, at air pressure difference of 20% of positive design wind pressure with a minimum of 6.24 lbf/psf.

3. For steel sheet, wherever a specific gage is specified in this Section, followed by a minimum thickness in inches, the minimum inch thickness shall govern, based on bare, uncoated sheet. There shall be no tolerance under the specified minimum inch thickness.

1.3 SUBMITTALS

A. Furnish submittals for items that are identified in this Section by a different typeface and a bracketed code (e.g., *Item [L]*). Refer to Division 1 General Requirements for definition of codes for types of submittals and the administrative requirements governing submittal procedure. General submittal requirements pertaining to this Section are specified herein under this Article.

B. Prepare and submit completely detailed Shop Drawings. Show completely dimensioned structural frame and erection layouts, openings in walls, any special framing details, details at corners, building intersections, expansion joints, trim, and flashing. Also indicate materials, gage or thickness, profiles, widths, lengths, special cuts, locations and types of flexible and metal closures, location and erection of subgirts, typical location and type of fasteners, and information necessary for adjacent work.

C. Submit, attesting that pressure-release fasteners are designed to fail at pressure specified and that fasteners are FM Approved and Listed.

D. *Structural Calculations [C]*: If specified manufacturer and product are not submittal, submit structural calculations for preformed metal siding system certifying to its conformance to the design criteria. Calculations and certification shall be prepared by a structural engineer licenses in the State of New York for product substitution.

1.4 QUALITY ASSURANCE

A. Requirements Of Regulatory Agencies
   1. Use materials and methods of installation to produce installed siding that complies with wind load requirements of governmental authorities having jurisdiction, unless different requirements are noted on the Structural Drawings or specified herein.
   2. Use FM Approved and Tested fasteners for securement of siding in areas designated or noted as "pressure-release siding" or "blow-out panels".

B. Installer Qualifications: The Work of this Section shall be carried out by an approved installer having specialized in this Work as its primary business for at least 5 years and having performed satisfactorily Work of this type and scope.

C. Engineer Qualifications: Verification of preformed metal siding systems by a professional engineer licensed in the area of jurisdiction where the project is located and experienced in product systems specified.

D. ULI classification for use as a component of a non-load bearing metal siding system per ASTM E 119 and indicated by designations in the UL "Fire Resistance Directory"

E. Provide data from a qualified testing agency of criteria specified in the previous article "Performance Requirements".

F. Mockups:
   1. At the beginning of the work for each particular type of application, the Contractor shall install the approved metal siding system to a sample area to enable the Owner's Representative to inspect the Contractor's methods of installation, workmanship and finished work. The sample areas will be designated by the Owner's Representative, but will not be less than 50 square feet. Work is to be continued only after the Contractor has received written approval of the inspected sample areas from the Owner's Representative. All subsequent work shall conform to the approved sample areas in every respect.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Store units at the site off the ground and in proper sequence to expedite installation.

B. Bundles or stacks of metal sheets shall not exhibit any form of sticking between sheets. Apply manufacturer's standard anti-stick process, or any other suitable system to assure compliance with this anti-stick requirement. Use anti-stick compound or ply that is readily removable and does not adversely affect the finished surfaces.

1.6 WARRANTIES

A. General Warranty: Special warranties specified below shall not negate the Owner's right that the Owner may have under prevailing local laws, or any other requirements of the Contract Documents. The special warranties specified below are in addition to other warranties and are concurrently applicable to other warranties made by the contractor by other requirements of the Contract Documents.

B. Polyvinylidene Fluoride Finish Warranty: Furnish to the Owner in an approved form, warranting the polyvinylidene fluoride finish will be nonfacing, nonconvertible, nonchalking, nonblistering, noncracking and permanently a part of the metal surface for a period of twenty years after acceptance of the building. State in the guarantee that any items showing failure during the guarantee period will be replaced or refinished to the original condition, at no cost to the Owner.

PART 2 PRODUCTS

2.1 INSULATED METAL SIDING

A. System
   1. *Insulated Metal Siding [D]:* Provide field-assembled system having an overall nominal thickness of 3-1/2 inches, consisting of 1-1/2 inch deep interior liner panel, 1-1/2 inch

thick thermal insulation, metal subgirts, and 1-1/2 inch deep profiled exterior siding sheet, complete with closures and metal trim.

B. Exterior Siding Sheet
   1. Metal and Gage:
      a. Galvanized steel sheet, 20 gage, design thickness .0358 inch, minimum thickness .034 inch (before any embossing and coating), formed to profile specified.
      b. Aluminum sheet, minimum .050 inch thick (before embossing and coating), formed to profile specified.
   2. Finish on Exterior Side of Exterior Sheet:
      a. Polyvinylidene Fluoride Finish as specified.
   3. Finish on Interior Side of Exterior Sheet:
      a. Prime Paint Finish as specified.
   4. Exterior Sheet Profile: 1-1/2 inch deep, 12 inch wide, concealed-fastener type.
      a. Centria IW-21A, or other approved manufacturer to match existing building exterior panel profile.

C. Interior Liner Panel
   1. Metal and Gage:
      a. Galvanized steel sheet, 20 gage, design thickness .0358 inch, minimum thickness .034 inch (before any embossing and coating), stucco embossing optional, formed to profile specified.
   2. Finish on Exposed Side of Liner Panel:
      a. Polyester Paint Finish as specified.
   3. Finish on Concealed Side of Liner Panel:
      a. Prime Paint (polyester paint) Finish as specified.
   4. Liner Profile: 1-1/2 inch deep, 24 inch wide panels with flat unperforated face, with male and female interlocking nesting edges, female edge factory-calked, of same manufacturer as the exterior siding sheet:
      a. Centria L-2V or V-Liner 24, or other approved manufacturer to match existing building liner panel.

2.2 MATERIALS

A. Galvanized Steel Sheet: Structural quality per ASTM A 653, Grade 37 minimum, hot-dipped galvanized per ASTM A 924.

B. Aluminum Sheet: Aluminum Association "Alclad" 3003H154 alloy, per ASTM B 209, with stucco-embossed surface.

C. Sub-Girts: Minimum 16 gage steel sheet per ASTM A 653, hot-dipped galvanized to Coating Designation G-90, Minimized Spangle and Chemically treated, formed to hat-shape sections or other shapes as standard with siding manufacturer.

D. Angle Closures: ASTM A 36 steel, hot-dipped galvanized per ASTM A 653 to Coating Designation G-90, Minimized Spangle and Chemically treated, of section sizes and weights to meet project requirements.

E. Fasteners: Use manufacturer's standard items, but conforming to the following minimum requirements:
   1. Exposed Fasteners: Type 305 stainless steel shank, self-drilling or self-drilling and tapping sheet metal screws with stainless steel and neoprene washer, and plastic-coated hex-head or separate head cap to match color of siding. Use 3/4" long for flashings and accessories, 1" or longer as required for siding sheets. Use neoprene washer of 1/32" to 1/16" thick, Shore A durometer of 60 to 90 and with anti-oxident additive.
   2. Concealed Fasteners: No. 14 x 1", minimum, cadmium-plated steel self-tapping screws.

F. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

G. Joint Sealing Material:
   1. Sealant Tape: Pressure-sensitive, 100% solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1.2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
   2. Joint Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, of type, grade, class, and use classifications required to seal joints in metal wall panels and remain weathertight; and as recommended in writing by metal wall panel manufacturer.
   3. For field-sealed joints, use sealant as specified in Sealants And Calking, Division 7.

H. Thermal Insulation: Un-faced semi-rigid glass fiber insulation Type 1 per ASTM C665, incombustible type with a flame spread rating of 25 or less per ASTM E 84, of same width as liner panel, minimum 1-1/2 inch thick and minimum 1.65 pcf density, to achieve a U-factor thermal insulating value of 0.15 or better.

I. Protective Coatings:
   1. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4 mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

J. Provide siding with factory applied strippable film.

2.3 FINISHES

A. Prime Paint Finish
   1. Baked-on Rust-inhibitive Prime Paint: Siding manufacturer's standard finish not less than 0.5 mil dry film thickness (0.2 mil prime and 0.3 mil finish) each side suitable for field painting.
      a. Provide manufacturer's standard primer color.
      b. Except color on exposed surfaces shall be "off-white".
   2. Finish shall meet the following performance requirements:
      a. *Salt Spray Test [T]:* When subjected to a salt fog spray test per ASTM B 117 for 250 hours, blistering shall not exceed 5% No. 6 blisters in the field (ASTM D 1654). No more than 1/16" creep corrosion and tape off from area scribed to base metal.

B. Baked Enamel Finish
   1. *Baked Enamel Finish [S]:* Siding manufacturers standard finish system, consisting of cleaning, conversion coating, prime coating, and finish coating, with minimum total dry film thickness of 1.0 mil (0.2 mil primer and 0.8 mil finish). Oven-cure prime coat prior to finish coat application. Provide finish coat of acrylic polyester or silicone polyester or equivalent polyester resin coating, factory-applied and oven-cured.
      a. Provide color to match existing building, per approved samples.
   2. Finish shall meet the following performance requirements:
      a. *Salt Spray Test [T]:* When subjected to a salt spray (fog) test performed per ASTM B 117 for 500 hours, blistering shall not exceed 5% No. 6 blisters in the field (ASTM D 1654). No more than 1/16" creep corrosion and tape off from area scribed to base metal.

C. Polyvinylidene Fluoride Finish (Kynar)
   1. *Polyvinylidene Fluoride Finish (Kynar) [S]:* Baked resin finish system to match existing building siding color, consisting of cleaning, conversion coating, prime coating, and finish coating, with minimum total dry film thickness of 1.0 mil (0.2 mil primer and 0.8 mil finish). Oven cure prime coat prior to finish coat application.
   2. Provide finish coat containing not less than 70% Kynar 500 or Hylar 5000 resin, factory applied and oven-cured, per specifications and requirements of Kynar or Hylar basic resin manufacturer and coating manufacturer.
      a. Akzo Coatings Trinar
      b. Valspar Fluropon
      c. PPG Duranar
   3. Finish Color:
      a. Finish color to match existing building siding color, per approved samples.
   4. *Polyvinylidene Fluoride Finish Performance Requirements [T]:* Finish shall meet the following performance requirements.
      a. Gloss: Per ASTM D 523; 20 to 30 on 60 degree gloss meter.
      b. Abrasion Resistance: Per ASTM D 968 with falling sand; coefficient of abrasion average of 70.
      c. Adhesion: Per ASTM D3359; no finish removal after 1/16 inch cross-hatching to bare metal, impacting to point of metal rupture, and subjecting to application and quick removal of cellophane tape.
      d. Salt Spray Test: Per ASTM B 117 for 1000 hours; with non or few No. 8 blisters in field and no more than 1/8" creep corrosion.
      e. Humidity Test: Per ASTM D 2247 at 100% humidity for 1000 hours; no softening or color change, and no blisters.
      f. Impact Test: Per ASTM D 2794 Gardner Impact tester when subjected to 160 in./lbs. and 9/16 inch ball; no loss of adhesion.
      g. Color Retention: Per ASTM D2244; maximum of 5 units change.
      h. Chalk Resistance: Per ASTM D659; minimum rating of 8.

2.4 CLOSURES, FLASHING AND TRIM

A. Closures
   1. Closure Strips: Per materials specified in item 2.5.H, provide flexible premolded to fit profile of siding sheet, to seal off voids between siding and adjacent construction, for installation in concealed locations such as at top and bottom ends of siding sheets where shown and where required for weather tightness.
   2. Metal Closure Strips: Provide fabricated to profile of siding sheet, to seal off voids between siding and adjacent construction where rubber type closure strips cannot be used. Fabricate of same metal, gage and finish as exterior siding sheets.

B. Flashings And Trim
   1. *Metal Flashing and Trim Members [D]:* Fabricate of same metal, gage and finish as exterior siding sheets. Provide members in minimum 10 foot lengths, with lapped and sealed weathertight expansion-contraction connections between lengths. Incorporate drips at lower edge of members exposed to rain run-off. Hem or double-back exposed free edges to engage separate slip-type clips.
   2. Fabricate flashing and trim members to provide a complete neat-appearing finished weathertight installation, including the following:
      a. Trim at external and internal corners of siding.
      b. Trim at top and bottom edges of siding.
      c. Jamb, head, and sill closure trim at all openings such as doors, windows, louvers, etc.
      d. Trim at building wall expansion joints.
      e. Metal copings at roof top edge of siding.
      f. Metal scuppers and trim for same.
      g. Downspouts where shown.
   3. *Flashings, Copings, Scuppers, and Downspouts [D]:* Fabricate items as shown, per applicable requirements of SMACNA "Architectural Sheet Metal Manual", and approved shop drawings.
   4. Provide trim sheets with strippable film on face side.

C. Corners: Corners shall be fabricated from flashing material matching siding and fastened with pop rivets.

2.5 DISSIMILAR MATERIALS ISOLATION

A. Where aluminum comes in contact with other materials and metals, insulate the contact surfaces of aluminum. Use aluminum bituminous coating, brushable non-hardening butyl coating, insulating tape or other system standard with the siding manufacturer and approved by the Owner's Representative.

PART 3 EXECUTION

3.1 INSTALLATION

A. General
1. Field erect this work per approved Shop and Erection Drawings, the published instructions and safety precautions of the manufacturer, as shown, and as specified in this Section.
2. Furnish and install clip angles, clips and similar retainer or fastener items to precast concrete, masonry and structural framing, as required for installation of this work.
3. Erect sheets true and plumb, in alignment with horizontal and vertical edges of the building, and anchor securely in place. Install all work to allow for thermal movement. Protect sheets from damage due to abuse or undue impact; do not install sheets that are bent, dented, chipped and otherwise defective.
4. Where sheets terminate at door frames or other opening frames, provide sheet metal jamb trim. Install sheets with over-lap side joints with lap leeward of the prevailing wind, and with not less than 1 full lap. Install exterior siding with end lap to match offset end lap as standard with the manufacturer, but not less than 2 inches.
5. Install exposed fasteners and perform button-punching to produce, neat, straight horizontal rows of uniformly spaced fasteners. Use concealed fasteners where possible; limit exposed fasteners to approved locations.
6. Welding of metal panel siding to wall framing in not permitted.

B. Insulated Metal Siding
1. Fasten interior liner panels at not over 12 inches O.C. to exterior side of structural supports, with flat face against supports, per manufacturer's printed directions. Butt ends of sheets together.
   a. At interlocking side joints: Force male and female edges of adjacent sheets together to provide a tight seal of the factory-installed joint sealing material.
   b. At overlapping side joints: Apply sealant between overlaps of adjacent sheets to provide a tight seal.
2. Install sub-girts at siding manufacturer's indicated spacing but at not over 48 inches o.c. Secure subgirts to legs of interior liner sheet with siding manufacturer's recommended fastening system. If fasteners are exposed on the interior of the building, cap with caps of color to match color of interior liner sheet.
3. Fasten the exterior sheets to subgirts at spacing recommended by the siding manufacturer. Provide additional fasteners in side laps to secure adjacent sheets to each other, as recommended by the siding manufacturer but at not over 48 inches o.c. Do not expose fasteners in the interior of the building.
   a. Seal overlap joints with a continuous bead of sealant.
   b. Seal interlocking joints by inserting male rib into female rib to effect a seal of the factory-installed joint sealing material.

C. Closures, Flashing, And Trim
1. Install all closures, flashing and trim as required to produce a neat, finished, weathertight installation. Provide proper sealant-sealed end laps in all long runs to allow for thermal movement and to remain weathertight. Secure all such members per manufacturer's

recommendations, but at minimum 12 inches o.c. Bed exposed flashing and trim, and members subject to rain penetration, in sealant.

a. Copings: Install at top edge of siding as shown. Secure hemmed free edges by hooking over concealed continuous metal cleats. Secure back edge to wall by approved means. Lap and seal all joints.
b. Scuppers: Construct in siding as indicated.
c. Wall Expansion Joints: Install metal trim at joints as required.
d. Downspouts: Install where and as shown; lap joints in direction of flow. Secure downspouts to wall. Seal all joints.

2. Install premolded closures at top and bottom ends of siding materials, at cap flashings, and above sill or ledge flashings to keep building weathertight; and, vermin and insect protected.
3. Set closures in place with a dab of sealant to keep closure from falling out when metal flexes.
4. Remove strippable film from siding as sheets are installed.

3.2 CLEANING AND TOUCH-UP PAINTING

A. Upon completion of siding installation, clean all surfaces of siding so as to be free from mud, dirt, abrasions and other surface blemishes. Re-finish all abraided surfaces to match finish, using materials and methods as recommended by the siding manufacturer and that are fully compatible with the original finish system. Repaired surfaces shall be uniform and free from variations in color and surface texture from that of adjacent, like surfaces. If repaired sheet is not acceptable to Owner's Representative, remove sheet and replace with a new sheet.

END OF SECTION

Revision History	
Date	**Rev. No.**
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